

On the Distribution of the Big-Eyed Tuna, *Parathunnus sibi*, in the Tropical Eastern Pacific Ocean

The big-eyed tuna, *Parathunnus sibi* (Temminck and Schlegel) (= *Parathunnus mebachi* (Kishinouye)), is one of several species of tunas which inhabit the Pacific Ocean. Like the oceanic skipjack (*Katsuwonus pelamis*) and the yellowfin tuna (*Neothunnus macropterus*), the big-eyed tuna is generally considered to be a tropical form, but it may also be found in subtropical waters as far north as 36° north latitude (Kishinouye, Tokyo Imp. Univ., Col. Agr., Jour. 8(3): 293–475, 1923). What little is now known of the habits of these fish indicate that the larger, older big-eyed tuna habitually live at depths well below the surface. Nonetheless, by the use of specialized fishing gear designed to reach these deep levels, sizable commercial fisheries for the big-eyed tuna have been developed in equatorial regions of the western and central Pacific Ocean. In contrast, *Parathunnus* is not as important or as well known in the eastern Pacific where fishing for tunas is confined entirely to surface methods.

Our general unfamiliarity with the big-eyed tuna is reflected in the paucity of information available on its occurrence and distribution in waters off the west coast of North America. Although the species was first reported from the eastern Pacific Ocean over 30 years ago, in 1920, by Kishinouye (*op. cit.*), the only definite record that I have been able to find which establishes distributional limits for *Parathunnus* in this region is that of Godsil and Byers (Calif. Div. Fish and Game, Fish Bul. 60: 1–131, 1944). In their exhaustive study of the Pacific tunas, these investigators had available two specimens of big-eyed tuna caught at two widely separated localities, one from Guadalupe Island off the coast of Lower California and the other from the Galápagos Islands off the coast of Ecuador. *Parathunnus sibi* was earlier included in a check list of Southern California fishes (Ulrey and Greeley, South. Calif. Acad. Sci., Bul. 27(1): 35, 1928) but this record was based solely on Kishinouye's account, which failed to mention the origin of the big-eyed tuna observed. It is most likely that the latter fish were brought in to San Pedro, California, by tuna vessels operating south of the United States-Mexico border. Roedel (Calif. Fish and Game 39(2): 251–262,

1953) lends weight to this assumption by stating that *Parathunnus sibi* has yet to be taken in California waters. To the south, American tuna fishermen have reported infrequent catches of fish identified by them as big-eyed tuna from as far below the equator as northern Peru.

That distributional records are not more complete is probably because the big-eyed tuna is often mistaken for the yellowfin tuna which it strongly resembles. In general, the big-eyed tuna has a somewhat larger head and eye, a deeper and more rotund body, and coarser scales than a yellowfin tuna of the same size, but as these characters are all relative there is no known way of identifying with certainty a big-eyed tuna by its external features. The length of the pectoral fin has been suggested as a character diagnostic of the big-eyed tuna (Godsil and Byers, *op. cit.*; Roedel, Calif. Div. Fish and Game, Fish Bul. 68: 1–153, 1948), the pectoral fin being more elongate than that of the yellowfin. Brock (Pacific Sci. 3(3): 271–277, 1949), however, has pointed out that this means of differentiating between the two species is not infallible because the length of the pectoral fin may vary with body length. The only positive way of identifying big-eyed tuna thus appears to be the use of certain internal features. Two of the distinctive anatomical characters for *Parathunnus* are the almost unexposed position of the spleen (well exposed in *Neothunnus*) in ventral view and the presence of marginal striations (absent in *Neothunnus*) on the ventral surface of the liver (Godsil and Byers, *op. cit.*).

In view of our superficial knowledge of the big-eyed tuna, it appears desirable to present some of the results of a recent expedition sponsored jointly by the Inter-American Tropical Tuna Commission, the California Department of Fish and Game, and the Scripps Institution of Oceanography. From January 31, 1953, to March 4, 1953, 26 fishing stations traversing the general area of the present eastern Pacific commercial tuna fishery, from 13°20' north latitude to 4°28' south latitude and from 99°10' west longitude to 84°38' west longitude, were occupied by the California State fisheries research vessel, "N. B. Scofield." At each station, upward of 50 baskets of longline gear, similar to

those used elsewhere in the Pacific, were fished to depths of approximately 150 feet. Large big-eyed tuna were captured at 10 localities (Table 1) of which 8 were in outlying oceanic waters not usually frequented by American tuna vessels. Fishing was best just north of the equator. Big-eyed tuna were caught as far south as 4°28' south latitude, which is about 200 nautical miles south of the Galápagos Islands, the southernmost limit from which big-eyed tuna have previously been recorded.

TABLE 1
RECORDS OF THE BIG-EYED TUNA, *Parathunnus sibi*,
FROM THE TROPICAL EASTERN PACIFIC OCEAN,
FEBRUARY TO MARCH, 1953

DATE	POSITION	NUMBER OF FISH
Feb. 3...	7°02'N-96°39'W	1
Feb. 4...	5°12'N-95°36'W	1
Feb. 5...	3°06'N-95°00'W	4
Feb. 6...	1°30'N-94°25'W	3
Feb. 8...	0°36'S-93°44'W	1
Feb. 9...	2°36'S-93°05'W	2
Feb. 10...	4°28'S-92°16'W	1
Feb. 13...	0°15'N-91°20'W	1
Mar. 1...	2°40'N-85°33'W	1
Mar. 4...	3°16'S-84°38'W	1

The big-eyed tuna caught by the longlines ranged in length from 991 to 1,814 millimeters and in weight from about 60 to 275 pounds. Most individuals were more than 1,400 millimeters long and weighed over 150 pounds.

These fish approximated in size big-eyed tuna which appear in commercial longline catches of the Japanese and Hawaiian fisheries, but they were considerably larger, on the average, than those which are occasionally reported by Pacific Coast fishermen although, according to them, large big-eyed tuna are sometimes taken at the surface near the Galápagos Islands.

All the large fish examined internally, both males and females, were in advanced ripening or ripe condition according to criteria established by Marr (U. S. Fish and Wildlife Serv., Fish. Bul. 51(44): 201-206, 1948). One male big-eyed tuna, 1,536 millimeters in total length, caught on March 4, 1953, at 3°16' south latitude, 84°38' west longitude, had just spawned or was in the last stages of spawning. The testes of this fish were much reduced in size compared to those of maturing individuals, and ripe milt was present in the central duct and in the urogenital sinus. It thus seems evident that the big-eyed tuna spawn in or near this region in the late winter or early spring months.

These findings further elucidate the distribution and relative abundance of big-eyed tuna in the tropical eastern Pacific Ocean. Moreover, they demonstrate the existence in this region of a deep-living parent stock of large big-eyed tuna which is not fished by fishing methods now used, a phenomenon heretofore suspected but unproved. The relationship between this population and those found further to the westward remains to be determined.—*Bell M. Shimada, Inter-American Tropical Tuna Commission, Scripps Institution of Oceanography, La Jolla, California.*

News Notes

The color plate facing page 208 of this issue was printed by a new three-color process developed by the Eastman Kodak Company and made available on a developmental basis through the Case-Hoyt Corporation of Rochester, New York. Because of simplified techniques reflected in lower costs, the process gives promise of making color illustration available to scientific workers on a much broader scale than was heretofore possible.

GRESSITT, J. L. *The Coconut Rhinoceros Beetle (Oryctes rhinoceros) with Particular Reference to the Palau Islands.* viii+157 pp., 50 figs. Bulletin 212, Bernice P. Bishop Museum, Honolulu. 1953.

SPOEHR, ALEXANDER. *Saipan: The Ethnology of a War-Devastated Island.* 383 pp., 32 figs. Fieldiana: Anthropology. Vol. 41. Chicago Natural History Museum, Chicago. \$5.00.